Learning Activity 2 – National Library of Virtual Manipulatives

EDT 514: Application of Instructional Design

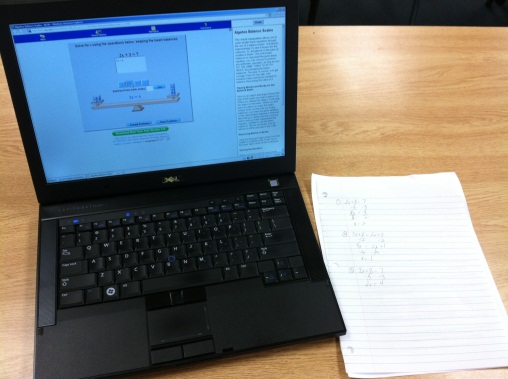
**Description:**

I teach middle school math intervention. As part of the curriculum, my 7th grade students will be learning how to solve 2-step equations. A 2-step equation is an equation in which you must undo two parts of the equation in order to solve for the variable. This usually entails adding or subtracting one piece and multiplying or dividing another piece of the equation. The very first thing I need my students to understand is what you do to one side of the equation you must do to the other side of the equation. I always tell my students that it is a balancing act and they must keep the equation balanced at all times.

I have a class set of laptops in my classroom, therefore all my students will be working by themselves and I will not have to check out the computer lab. To help them understand this concept I will have then go to the [National Library of Virtual Manipulatives](http://nlvm.usu.edu/en/nav/frames_asid_201_g_4_t_2.html?open=instructions&from=category_g_4_t_2.html) website. At this website my students will find an interactive balance that will help them solve 2-step equations and visualize keeping the equation balanced. Before I have my students get started, I will bring up the website on my interactive whiteboard and show them how to setup the balance to represent the equation and how to solve the equation. When they start, they will need to follow the same steps that I did when I showed them. If they have any questions on how to use the interactive balance there are instructions along the right side of the website for them to use. I will also be walking around the classroom monitoring what they are doing, so I will be able to answer any questions they have. Once they have a good handle on this activity, which means that they will understand that they need to keep the equation balanced at all times, I will have them do the same thing with [negative numbers](http://nlvm.usu.edu/en/nav/frames_asid_324_g_4_t_2.html?open=instructions&from=category_g_4_t_2.html). This will allow them to not only work on solving 2-step equations and keeping the equation balanced, but they will be working on computations with positive and negative integers, which is always a struggle.

Without the technology, I would have to purchase actual manipulatives for the students to use. This, of course, would not be practical because I don’t have any sort of budget. I could purchase one balance to demonstrate for the whole class, but students don’t gain as much from something like that as they would by having their own. In my students’ regular math class the teacher will be showing them how to balance equations on paper and pencil. Most of my students need to be shown a different way to think about how this is done. The website I am using allows my students to actually visualize balancing an equation. Algebra is very difficult to visualize and many of the students I see are visual learners, which explains why they struggle with algebra.

Balancing an equation is not a skill that is taught in another grade, besides 7th, or in another unit, besides solving 1-step equations. I will not have an activity planned to assess prior knowledge for this specific activity because I teach solving 2-step equations right after I teach solving 1-step equations. I will know how much they understand about balancing equations from the prior unit. Most of my students will all have the same amount of prior knowledge on how to balance an equation. However, this does not mean that they all have mastered this skill. Balancing an equation is, usually, something that has to be practiced repeatedly.

To assess whether my students mastered the skill of balancing equations, I will have each student write down 10 of the equations the computer has them balance. I will also have them write on a piece of paper the steps they are following to solve the equations (see picture to right). This will help them see that what they are doing with the balance on the computer is the same thing as what they are doing with paper and pencil in their general math class. Students don’t always make the connection between what they do in my math intervention class to what they are doing in general math.

**Unit Standards:**

**GLCE:**

A.FO.A06.11 Relate simple linear equations with integer coefficients, e.g., 3x = 8 or x + 5 = 10, to particular contexts and solve.\*

A.FO.06.12 Understand that adding or subtracting the same number to both sides of an equation creates a new equation that has the same solution.

A.FO.06.13 Understand that multiplying or dividing both sides of an equation by the same non-zero number creates a new equation that has the same solutions.

A.FO.06.14 Solve equations of the form ax + b = c, e.g., 3x + 8 = 15 by hand for positive integer coefficients less than 20, use calculators otherwise, and interpret the results.

**NETS-T:**

1a. Promote, support, and model creative and innovative thinking and inventiveness

2a. Design or adapt relevant learning experiences that incorporate digital tools and resources to promote student learning and creativity

2b. Develop technology-enriched learning environments that enable all students to pursue their individual curiosities and become active participants in setting their own educational goals, managing their own learning, and assessing their own progress.

**Content/Pedagogical/Technology Knowledge:**

Through my career as a math student, I have learned how to solve equations, both 1-step and 2-step. My content knowledge of middle school math is up to par. My goal as an intervention teacher is to use my pedagogical knowledge and knowledge of technology to get my students to be more successful in math. I do this by breaking down math concepts even further for my students. I also am able to integrate more technology into my lessons, compared to a general math teacher, because I have a class set of laptops. Every day I incorporate my content, pedagogical, and technology knowledge into what I am doing in the classroom.

Pedagogy is how I go about getting my students to understand the concepts that I am teaching. In this lesson the content is learning to keep equations balanced in order to solve for the variable. I have my students use the website with the interactive balance to help them understand how we balance equations and that it is imperative to understand that what we do to one side of an equation we must do to the other side.

The technology in this lesson allows my student to visualize and understand what I mean when I tell them to balance an equation. My students should be able to get to the website by themselves. However, they will not know exactly how the interactive balance works. This is why I will show them how to work the balance before I let them work on their own.

Overall, this is a website that I had a few of my students use last year that were struggling with keeping the equation balanced. They really liked the visualization and it seemed to help them. I’m interested to see how well it works with my whole class this year.